a7

probe beam 46 to pass through PBS 36.--

Please amend the third whole paragraph on page 8 of the specification to read as follows:

--In Figure 2 a pair of matched detectors 160, 165 are provided that each detect the combined (i.e., wavefront-matched) signals from each of the zero-order and first-order-diffracted output "ports" of the beam combiner 140, so that common-mode (additive noise) can be compensated. The outputs of the detectors 160, 165 are combined in an amplifier/processor 170. Lenses L (see Figure 6) can be used between the adaptive beam combiner 140 and the respective detectors 160, 165 to focus the beams emanating from the adaptive beam combiner thereat.--

a8

In the Claims:

Please amend the claims as indicated below (please see the appendix for a marked version of the amended claims).

a9

1. An optical apparatus for coherent detection of an input optical beam, the apparatus comprising:

(a) a beam splitter for splitting the input optical beam into a first component and a second component, the optical beam having information content with a minimum signal frequency component;

(b) an optical delay device arranged to receive the second component, the optical delay device imposing an intentional delay in the second component of the input optical beam;

(c) an adaptive beam combiner coupled to receive

(i) the second component with a delay imposed thereon by the optical delay device; and

(ii) the first component from the beam splitter;

the adaptive beam combiner having two exiting optical components having the same wavefronts and propagating directions as the first and second components and being in quadrature; and

(d) a detector arrangement for receiving and detecting the first and second exiting components from the adaptive beam combiner.

G5

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6. A method for detecting sonic vibrations in a test material having a test surface comprising:

(a) generating a beam of light having a wavelength;

(b) splitting said beam into a first beam and a second beam;

(c) directing said first beam onto said test surface to be scattered by said test surface with data having a minimum signal frequency component;

(d) delaying the second beam by a period of time which is greater than an inverse of the minimum signal frequency component;

(e) directing at least a portion of said scattered first beam and the delayed second beam on an adaptive beam combiner, the adaptive beam combiner emitting two beams which are in phase quadrature; and,

(f) directing the beams emitted by the adaptive beam combiner onto respective photodetectors and associated circuitry to result in an electrical output signal that is representative of the vibrating test surface.

G10

7. The method of claim 6 wherein said generated beam of light is a polarized coherent light beam and wherein said first and said second beams are co-propagating and co-polarized when impinging said adaptive beam combiner.

8. The method of claim 7 wherein said first and said second beams are not co-propagating and co-polarized immediately after the second beam is delayed by the delaying step but wherein the first and second beams are independently subjected to a polarization correcting step to ensure

that each of said first and second beams has the same polarization as the other beam.

11. An apparatus for sensing sonic vibrations on a material having a test surface, comprising:

(a) a light generating source for generating a coherent, co-polarized beam of light having a predetermined wavelength;

(b) a beam splitting apparatus for receiving said generated light beam, splitting said generated light beam into at least a first light beam and a second light beam, and for directing said first light beam to a test material test surface capable of at least scattering said first beam with data having a minimum signal frequency component;

(c) an optical delay device for delaying at least one of said first and second beams with a delay which is greater than an inverse of the minimum signal frequency component;

(d) an adaptive beam combiner having a receiving surface for receiving at least a portion of said scattered first light beam at a first angle relative to said receiving surface, and for receiving said second light beam at a second angle relative to said receiving surface which second angle is different from said first angle, for interfering said first and said second beams to introduce a phase shift difference between said first and said second beams, and for producing co-propagating light waves comprising at least a portion of said first beam and at least a portion of said second beam received by said receiving surface;

(e) photodetectors for receiving co-propagated light beams from said adaptive beam combiner; and

(f) circuitry coupled to the photodetectors for producing an electrical output signal that is representative of the vibrating test surface.

Please add the following new claims:

14. The optical apparatus of claim 4 wherein the optic fiber is multi-mode optic fiber and wherein the first and second components impinging the adaptive beam combiner are multi-mode

optical beams.

15. The optical apparatus of claim 1 wherein the first and second components are multi-mode beams with electric field amplitudes S_1 and S_2, respectively, and wherein the two exiting optical components from the adaptive beam combiner are beams which are respectively wavefront-matched to the first and second components impinging the adaptive beam combiner .

Sub B1

16. The optical apparatus of claim 15 the two exiting optical components two exiting optical components have the same wavefronts and propagating directions as the first and second components and being in quadrature.

17. The optical apparatus of claim 15 wherein the wavefront-matched output beams that emerge from the beam combiner are either (i) co-propagating plane waves or (ii) aberrated waves having the same wavefronts and propagation direction as the first and second components impinging the adaptive beam combiner .

18. The method of claim 6 wherein the delaying step is preformed by a length of multi-mode optic fiber and wherein the scattered first light beam and the second light beam impinging the adaptive beam combiner are multi-mode optical beams.

19. The apparatus of claim 11 wherein the optical delay line is multi-mode optic fiber and wherein the scattered first light beam and the second light beam impinging the adaptive beam combiner are multi-mode optical beams.

Sub B2

20. A method for detecting sonic vibrations in a test material having a test surface comprising:

(a) generating a beam of light having a wavelength;

(b) splitting said beam into a first beam and a second beam;